AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions of claims in the application.

Listing of Claims

1. (Currently Amended): An isolated O-glycan α2,8-sialyltransferase having substrate specificity and substrate selectivity,

wherein the enzyme has substrate specificity wherein the substrates of the enzyme are glycoconjugates having a Siaα2,3(6)Gal structure wherein Sia represents sialic acid and Gal represents galactose at the terminus thereof; and

wherein the enzyme has substrate selectivity wherein the enzyme incorporates sialic acids into O-glycans more preferentially than into glycolipids or N-glycans.

2. (Currently Amended): An isolated O-glycan α2,8-sialyltransferase having ~~either one of the following amino acid sequences:~~

~~(1) an~~ the amino acid sequence shown in SEQ ID NO: 1 or 3~~; or~~

~~(2) an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 1 or 3, and having O-glycan α2,8-sialyltransferase activity~~.

3-7. (cancelled)

8. (Currently Amended): A method for producing O-glycan α2,8-sialyltransferase, comprising

culturing ~~wherein the~~ a transformant ~~of claim 7 is cultured~~ transformed with an expression vector comprising either of the following nucleotide sequences:

(1) a nucleotide sequence corresponding to a portion between nucleotide 77 and nucleotide 1270 of a nucleotide sequence shown in SEQ ID NO: 2; and

(2) a nucleotide sequence corresponding to a portion between nucleotide 92 and nucleotide 1285 of a nucleotide sequence shown in SEQ ID NO: 4; and

collecting O-glycan α2,8-sialyltransferase ~~is collected~~ from the culture.

9. (Currently Amended): [[A]] An isolated protein which comprises an active domain of O-glycan α2,8-sialyltransferase having any one of the following amino acid sequences:

(1) an amino acid sequence ~~corresponding to a portion between positions~~ comprising amino acids 26 ~~and~~ to 398 of the amino acid sequence shown in SEQ ID NO: 1; and

~~(2) an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence corresponding to a portion between positions 26 and 398 of the amino acid sequence shown in SEQ ID NO: 1, and having O-glycan α2,8-sialyltransferase activity;~~

~~[[(3)]]~~ (2) an amino acid sequence ~~corresponding to a portion between positions~~ comprising amino acids 68 ~~and~~ to 398 of the amino acid sequence shown in SEQ ID NO: 3; ~~and~~

~~(4) an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence corresponding to a portion between positions 68 and 398 of the amino acid sequence shown in SEQ ID NO: 3, and having O-glycan α2,8-sialyltransferase activity~~.

10. (currently amended): An isolated extracellular secretory protein comprising a polypeptide portion which is an active domain of the O-glycan α2,8-sialyltransferase of claim 1, and a signal peptide, and has O-glycan α2,8-sialyltransferase activity.

11-14. (Cancelled)

15. (Currently Amended): A method for producing a protein comprising an active domain of O-glycan α2,8-sialyltransferase ~~wherein the~~ comprising culturing a transformant ~~of claim 14 is cultured~~ transformed with an expression vector comprising a gene encoding a protein according to claim 9; and

collecting the protein ~~is collected~~ from the culture.

16. (Withdrawn): β-galactoside α2,6-sialyltransferase having activity and substrate specificity,

wherein the activity comprises enzyme transfer of sialic acid through an α2,6 linkage into the galactose portion of a sugar chain having a galactose β1,4N-acetylglucosamine structure at the terminus thereof; and

wherein the enzyme has substrate specificity wherein the substrate of the enzyme is a sugar chain having a galactose β1,4N-acetylglucosamine structure at the terminus thereof, and lactose and a sugar chain having a galactose β1,3N-acetylglucosamine structure at the terminus thereof are not the substrate of the enzyme.

17. (Withdrawn): β-galactoside α2,6-sialyltransferase having either one of the following amino acids:

(1) an amino acid sequence shown in SEQ ID NO: 5 or 7; or

(2) an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence shown in SEQ ID NO: 5 or 7, and having β-galactoside α2,6-sialyltransferase activity.

18. (Withdrawn): A β-galactoside α2,6-sialyltransferase gene encoding the amino acid sequence of the β-galactoside α2,6-sialyltransferase according to claim 17.

19. (Withdrawn): The β-galactoside α2,6-sialyltransferase gene according to claim 18 which has any one of the following nucleotide sequences:
(1) a nucleotide sequence corresponding to a portion between nucleotide 176 and nucleotide 1762 of a nucleotide sequence shown in SEQ ID NO: 6;
(2) a nucleotide sequence comprising a deletion, substitution, and/or addition of one or several nucleotides with respect to the nucleotide sequence corresponding to a portion between nucleotide 176 and nucleotide 1762 of the nucleotide sequence shown in SEQ ID NO: 6, and encoding a protein having β-galactoside α2,6-sialyltransferase activity;
(3) a nucleotide sequence corresponding to a portion between nucleotide 3 and nucleotide 1574 of a nucleotide sequence shown in SEQ ID NO: 8; and
(4) a nucleotide sequence comprising a deletion, substitution, and/or addition of one or several nucleotides with respect to the nucleotide sequence corresponding to a portion between nucleotide 3 and nucleotide 1574 of the nucleotide sequence shown in SEQ ID NO: 8, and encoding a protein having β-galactoside α2,6-sialyltransferase activity.

20. (Withdrawn): A recombinant vector comprising the β-galactoside α2,6-sialyltransferase gene according to claim 18.

21. (Withdrawn): The recombinant vector accrding to claim 20 which is an expression vector.

22. (Withdrawn): A transformant transformed with the recombinant vector according to claim 20.

23. (Withdrawn): A method for producing β-galactoside α2,6-sialyltransferase wherein the transformant of claim 22 is cultured and β-galactoside α2,6-sialyltransferase is collected from the culture.

24. (Withdrawn): A protein comprising an active domain of β-galactoside α2,6-sialyltransferase having any one of the following amino acid sequences:
(1) an amino acid sequence corresponding to a portion between positions 33 and 529 of the amino acid sequence shown in SEQ ID NO: 5;
(2) an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence corresponding to a portion between positions 33 and 529 of the amino acid sequence shown in SEQ ID NO: 5, and having β-galactoside α2,6-sialyltransferase activity;
(3) an amino acid sequence corresponding to a portion between positions 31 and 524 of the amino acid sequence shown in SEQ ID NO: 7; and
(4) an amino acid sequence comprising a deletion, substitution, and/or addition of one or several amino acids with respect to the amino acid sequence corresponding to a portion between positions 31 and 524 of the amino acid sequence shown in SEQ ID NO: 7, and having β-galactoside α2,6-sialyltransferase activity.

25. (Withdrawn): An extracellular secretory protein, which comprises a polypeptide portion which is an active domain of the β-galactoside α2,6-sialyltransferase according to claim 16, and a signal peptide, and has β-galactoside α2,6-sialyltransferase activity.

26. (Withdrawn): A gene encoding the protein according to claim 24.

27. (Withdrawn): A recombinant vector comprising the gene according to claim 26.

28. (Withdrawn): The recombinant vector according to claim 27 which is an expression vector.

29. (Withdrawn): A transformant transformed with the recombinant vector according to claim 27.

30. (Withdrawn) A method for producing a protein comprising an active domain of β-galactoside α2,6-sialyltransferase wherein the transformant of claim 29 is cultured and the protein is collected from the culture.